MANPRINT BULLETIN

Vol. II No. 6

March/April 1988

Health Hazards: Their Habits and Haunts

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Editor's Note: This is the third in a series of articles on the Army's Health Hazard Assessment Program.

A health hazard is a health threatening condition which troops encounter while using materiel. The hazard can occur during normal use of equipment, interactions with environmental factors, maintenance and repair activities, logistics support functions, misuse, and malfunction. The Army's Health Hazard Assessment (HHA) program focuses on its own materiel and operations rather than on enemy weapons or local infectious diseases. This article examines health hazards commonly encountered in Army systems.

Health hazards arise from characteristics of the system and the environment in which it operates. Chemically active substances abound in manufacturing, operating, and maintaining most systems. Normal operation of materiel systems, components, assemblies, etc., produces energy in specific forms such as mechanical, electromagnetic and thermal, as well as chemical byproducts. In the operational setting, environmental aspects—most notably, temperature extremes, humidity, wind, high altitude, and biological substances—interact intimately with the system and its crewmembers. All of these potentially harmful factors give rise to five major categories of health hazards: mechanical forces, chemical substances, biological substances,

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Army Acquisition (AAE) Policy Memorandum

Editor's Note: The following is a summary of a 10 November 1987 memorandum (#87-7) issued by the Under Secretary of the Army, James R. Ambrose.

This memorandum further defines the responsibilities of Program Executive Officers (PEOs) and clarifies the roles of the Office of the Assistant Secretary of the Army (Research, Development and Acquisition) (OASA[RDA]) and Army Major Commands (MACOMs) in their support of PEO-managed systems.

PEOs supervise assigned program, project, and

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radiation energy, and environmental extremes.

Mechanical Forces

The potentially hazardous mechanical forces found among Army systems include acoustical energy (noise), vibrations, shock, and trauma. These hazards tend to occur together as characteristics of engines, drive trains, tracks and wheels, transmissions, rotors, guns/cannons, and munitions—common components of Army vehicles and aircraft. The basic forms, generic sources, and common system/component sources of each type of mechanical force are outlined below.

Noise, steady state: intermittent, sustained, narrow or wide band. Arises from generating, transmitting, and converting power; drive elements interacting with ground or air; generation of sound; gas or fluid flow/friction; steady combustion.

System source examples: tracked or wheeled vehicles, self-propelled artillery; aircraft (rotary- and fixed wing); communication headsets and speakers; alerting or warning signals; power generators; training simulators; maintenance tools and equipment; gas torches; compressed air/gas.

Noise, impulse: blast, impact, repetitive or nonrepetitive. Arises from propellant combustion; detonation of explosives; sudden release of pressure; forceful impact.

System source examples: pistols, rifles, machine guns; grenades; mortars, cannons, tank guns, howitzers; recoilless rifles, rockets, missiles; nuclear warheads; explosives; training simulators; impact tools and equipment.

Vibration: high or low frequency, linear, rotational, intermittent or sustained. Arises from generating, transmitting, and converting power; drive elements interacting with ground or air; resonance dynamics; induced changes or oscillations in system attitude or position.

System source examples: tracked or wheeled vehicles, self-propelled artillery; aircraft (rotary- and fixed-wing); training simulators; maintenance tools and equipment.

Shock: acceleration, deceleration, force loading. Arises from system impact (crash, collision, hard landing); system recoil; sudden aircraft displacement due to air turbulence; windblast; parachute opening.

System source examples: aircraft (rotary- and fixed-wing); tracked and wheeled vehicles, self-propelled artillery; parachute systems.

Trauma: blunt, sharp, musculoskeletal. Arises from objects or components impacting soldier; weapons blast or recoil; shattering of components or materials; limb or head flail due to vehicle/terrain interaction; airblast; musculoskeletal overload.

System source examples: tracked and wheeled vehicles; artillery (towed, self-propelled); tank guns; aircraft (rotary- and fixed-wing); hand-held guns, shoulder-fired rockets/missiles; maintenance tools and equipment; compressed air/gas; explosive training devices; excessive operator force/exertion.

Chemical Substances

Toxic chemical substances are among the most pervasive health hazards. Chemically active compounds frequently occur in basic system construction (e.g., paints, sealants, adhesives), routine operations and logistical support (e.g., fuels, coolants), maintenance (e.g., solvents, cleaning agents), and special functions (e.g., fire/flame suppression, decontamination) and are readily identifiable as such. In contrast, there is another family of substances generated by normal system operations, usually byproducts of engine combustion and weapons combustion. These primary substances and byproducts occur as liquids, gases, and solids, as described below.

Liquids: stable, volatile, enclosed, open. Associated with fueling, maintaining, and repairing systems; systems salvage and disposal; pest and plant control; decontamination; generation of obscurants; sewage handling and treatment. Common types include fuels, lubricants, coolants, hydraulic fluids; solvents, cleaning agents; paints, adhesives; pesticides, herbicides, defoliants; decontamination solutions.

System source examples: systems incorporating combustion engines (piston, turbine), hydraulics, air conditioners; systems for handling, storing, and transporting fuels and other petroleum products; maintenance, paint, and repair shops; sewage handling and treatment systems; systems for storing, transporting, and dispensing pesticides, herbicides, and defoliants; decontamination systems; fog oil generators.

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Soldier Performance Research and Analysis Review (SPRAR)
MANPRINT Working Group Survey

Describe your MANPRINT R&D Need in the spaces below. Provide a short title or "Bullet" if possible. Be certain to complete the lower portion of the questionnaire. (Ignore the numbers in parentheses.)

Multiple needs may be described on copies of the questionnaire. Use a separate questionnaire for each need.

Fold, staple, and mail your questionnaire(s) to address provided, or FAX to the numbers listed below.

- -

POC: Number ___ of ___

Telephone:

Description of MANPRINT Need

____

____

____

____

____

"Bullet": ____

Urgency:
- ____ Immediate (less than 1 year) (1)
- ____ Near Term (1 to 3 years) (2)
- ____ Long Term (more than 3 years) (3)

Who is most affected?

- ___ Combat Developers (4)
- ___ Materiel Developers (5)
- ___ Training Developers (6)
- ___ Test & Eval. Personnel (7)
- ___ HQDA (8)
- ___ DOD (9)
- ___ Industry (10)

What functional area is most affected?

- ___ defining system requirements (11)
- ___ stating requirements (12)
- ___ designing system hardware,software, courseware, etc. (13)
- ___ evaluating systems and their components (14)

Primary MANPRINT domain affected?

- ___ System Safety (15)
- ___ Health Hazards (16)
- ___ Training (17)
- ___ Personnel (18)
- ___ Manpower (19)
- ___ Human Factors Engineering (20)
- ___ MANPRINT Integration (21)

RETURN TO: HQDA
ATTN: DAPE-MRP
Washington, DC 20310-0300
FAX: AV 225-3195
COMM (202) 695-3195

Soldier Performance Research & Analysis Review (SPRAR)
MANPRINT Working Group Study

MANPRINT, Research & Studies (DCSPER) must identify the gaps in the on-going and planned MANPRINT-related R&D programs. The first step is to determine what you the MANPRINTer needs to support systems development and to build and execute SMMPs.

TAKE SOME TIME AND COMPLETE THE SURVEY FORM (on the back). What do you need from the R&D community? New tool? New or improved technology? Data? Give us at least one suggestion!! We want responses from all sectors of the MANPRINT community: prime- and subcontractors, all developers, and T&E personnel.

Once we have a good picture of the R&D requirements from your perspective, we will proceed to compare it with our research programs. Any necessary adjustments can then be made.

Thank you for your support.

---------------------------------fold, staple, and return or FAX ---------------------------------

FROM:

TO: HQDA
ATTN: DAPE-MRP
Washington DC 20310-0300

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Gases: vapors, fumes. Arise from vaporization of liquids listed above; engine or weapons combustion; compressed gas; air filtration; electric motors; welding; flame/fire suppression.

System source examples: systems incorporating combustion engines (pistons, turbines), hydraulics, air conditioners; systems for handling, storing, and transporting fuels and other petroleum products; maintenance, paint, and repair shops; gas torches; machine guns, tank guns, cannons, mortars, howitzers, recoilless rifles, rockets, and missiles; gaseous fire suppression systems (e.g., Halon); systems for handling, storing, transporting, and dispensing liquid pesticides, herbicides, and defoliants; sewage handling and treatment systems; compressed gas systems and containers; liquid decontamination systems; protective filters.

Solids: coatings, aerosals, mists, dusts, smoke, particulates. Arise from system-environment interaction; burning materials; generation of smokes/obscurants; construction activities; blasting; welding, brazing, soldering; cutting, grinding, and sanding of metals, plastics, wood; decontamination; pest and plant control; air filtration.

System source examples: tracked and wheeled vehicles; aircraft (rotary- and fixed-wing); artillery (towed, self-propelled); munitions; explosives; smoke obscurant systems; construction equipment; maintenance, paint, and repair shops; power saws, grinders, and sanders; welding, brazing, and soldering equipment; powder-form decontamination systems; systems for handling, storing, transporting, and dispensing pesticide and herbicide dusts; protective filters.

Biological Substances

Hazardous biological substances result from contamination or infiltration of systems by disease-causing microorganisms residing in the earth's environment. Common types include bacteria, viruses, parasites, Rickettsia, and fungi. These organisms may grow (or at least survive) wherever there is a "reservoir" containing a hospitable medium such as water or nutrified liquid.

System reservoir examples: containers, tanks, lines, tubes, compartments, and receptacles where a hospitable liquid may occur, collect, or circulate; systems for processing, handling, storage, transporting, preparing and dispensing foodstuffs (both solid and liquid form) and water; medical supplies and biologicals; waste disposal equipment; sanitation systems; sewage handling and treatment systems.

Radiation Energy

Common types of radiation which accompany Army systems include visible light, infrared, ultraviolet, radiofrequency energy, laser energy, and ionizing radiation. Systems or subsystems designed for special functions, especially of an electrical or electronic nature, frequently give rise to these types of energy. The basic forms and generic sources of each type of radiation are summarized below.

Visible light, high intensity: artificial, natural, transient, sustained. Generic sources: search lights, landing lights, strobes, high intensity lamps, light amplification devices, cathode ray tubes, natural sunlight, highly reflective surfaces, laser reflection, gas torches, nuclear flash.

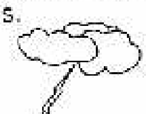
Infrared: sustained, transient. Generic sources: heating elements (such as those used in food preparation equipment and space heaters), gas torches, soldering equipment, electronic repair equipment.

Ultraviolet: near and far UV, artificial, natural, transient, sustained. Generic sources: ultraviolet lamps, gas torches, gas discharge tubes, natural sunlight (varies with season, altitude, etc.).

Radiofrequency energy: microwaves, millimeter waves, transient, sustained. Generic sources: telecommunications systems, radar systems, microwave ovens.

Laser energy: pulsed, transient, sustained. Generic sources: rangefinders, target designators, training simulators, sensor-targeted countermeasure systems, material processing systems.

Ionizing radiation: transient, sustained. Generic sources: high-voltage electronics, X-ray equipment, radioluminescent materials, nuclear weapons, depleted uranium munitions.



Environmental Extremes

On the training range and the battlefield, environmental factors such as temperature, humidity, wind, and altitude interact with combat systems and

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eir operators. In their extreme forms and ombinations, these factors may threaten the oldier's health. The Army is concerned with three ategories of environmental extremes—ambient eat, ambient cold, and oxygen deficiency.

Ambient heat: convection, radiant, natural, artifi-al, transient, sustained. Arises from environmental eat, sunlight; heat-generating systems and subsys-ems; human metabolism.

System source examples: tracked and wheeled ehicles; self-propelled artillery; aircraft (rotary- and xed wing); cannons, guns, rockets, missiles (as omponents of systems with enclosed crew compart-nents); training simulators; collective shelters; pro-ective clothing and equipment; food preparation equipment; heaters; lamps; electrical/electronic equipment. Contributing factors: humidity, wind, clothing, workload.

Ambient cold: natural, artificial, transient, sus-ained. Arises from environmental cold, ice; cooling subsystems.

System source examples: tracked and wheeled vehicles; self-propelled artillery; aircraft (rotary- and fixed-wing); systems/subsystems for air conditioning, refrigeration, and frozen storage; training simulators; collective shelters. Contributing factors: humidity, moisture, wind, clothing, workload.

Oxygen deficiency: natural, artificial, transient, sustained. Arises from high altitude (terrestrial, airborne); oxygen displacement in confined spaces; systems which constrain breathing.

System source examples: aircraft (rotary- and fixed-wing); airborne operations; high altitude operations; altitude chamber; gaseous fire suppression systems; protective masks, respirators. Contributing factors: workload, ambient temperature, engine and weapons combustion fumes, fuel vapors.

While few Army systems involve all of the culprits presented in this article, most include at least some of them. Potential health hazards must be evaluated to determine the level of risk involved, so it is imperative that they be identified in system requirements documents, the System MANPRINT Management Plan, the Test and Evaluation Master Plan, the Integrated Logistics Support Plan, and related documents. Such identification will ensure that adequate evaluation activities are planned, funded, and implemented.

Continuing review of the system/subsystem/component characteristics must be built into system design and development to identify and control potential health hazards early on. The Health Hazard Assessment Report (HHAR), along with medical input to requirements documents, provides the formal mechanism for accomplishing this review process. The next article in this series will analyze the preparation of an HHAR.

For additional information, contact LTC Bruce Leibrecht, U.S. Army Aeromedical Research Laboratory, P.O. Box 577, Fort Rucker, AL 36362-5292, AV: 558-6800 or (205) 255-6800.

"MANPRINT Handbook for RFP Development" Now Available

The newly-released "MANPRINT Handbook for RFP Development" (AMC-P 602-1) is designed to assist personnel in preparing a Request for Proposal (RFP) for any phase of a major system development program. The handbook, which focuses on how to include MANPRINT requirements in the RFP, discusses each of the six domains that comprise MANPRINT and explains how these domains and their integrated products relate to the materiel acquisition process. Each domain is separately examined, and those specific documents and agencies that can provide assistance in RFP development are identified. Also included is a discussion of preceding events and activities that shape the structure and content of the MANPRINT requirements in the RFP. The handbook concludes with sample portions of an RFP for a major notional Army weapon system showing significant MANPRINT implications.

The handbook (#AD-A188321) may be obtained from the Defense Technical Information Center (DTIC) by agencies of the Federal government and government contractors holding DTIC accounts. To open a DTIC account, contact DTIC, Cameron Station, Alexandria, VA 22304-6045. Telephone: AV 284-7633, COMM (202)274-7633.

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product managers (PMs); they are responsible for the planning, programming, budgeting, and execution necessary to guide their programs through all milestones in order to field their systems within cost, schedule, and performance baselines. Specific PEO responsibilities are:

- Integrate across-assigned programs.
- Extend AAE management oversight to PMs.
- Coordinate inter-PEO relationships with strong horizontal coordination to support fielding by unit sets.
- Charter and rate assigned PMs.
- Ensure continuing mission area interface with the U.S. Army Training and Doctrine Command (TRADOC) and TRADOC proponent centers and schools.
- Track and enforce program baselines.
- Monitor PM and contractor performance to include significant contract management issues.
- Ensure development of required documentation for all scheduled reviews.
- Ensure that Manpower and Personnel Integration (MANPRINT) and safety considerations are properly addressed in system development.
- Coordinate, as required, with functional staffs at the Army staff and Secretariat levels.
- Ensure that a Baseline Cost Estimate is completed.

The PEO and his staff organizations will provide program information to the Department of the Army, Department of Defense, and Congress; the PEO will also defend assigned programs to Congress through the Army Legislative and Budget Liaison Offices.

The PEO will prepare papers and positions ensuring that the Army "speaks with one voice" by coordinating these papers and positions with the appropriate offices. He must keep these offices informed of program status, issues/problem areas and their respective resolutions.

PEOs will participate in the development of data to support programmatic decisions in the Planning, Programming, Budgeting, and Execution System (PPBES). In the planning and programming phase, the PEO will provide development and acquisition resourcing data to the Long Range Research Development and Acquisition Plan (LRRDAP) through U.S. Army Materiel Command (AMC) Mission Area Managers. PEOs should identify other resource requirements (such as supporting requirements for training, test suite instrumentation, etc.) to the appropriate MACOM for entry into the LRRDAP process. PEOs will also be afforded the opportunity to participate in the Headquarters, Department of the Army (HQDA) review of the LRRDAP.

PEOs must establish a close liaison with their combat developer (e.g., TRADOC) counterparts to ensure user-satisfaction; such an interface will emphasize early identification of system requirements, systems and requirements status, and cost benefit and trade-off analysis. A user representative will normally accompany the PEO to Major Automated Information System Review Council (MAISRC), Army System Acquisition Review Council (ASARC), and Defense Acquisition Board (DAB) briefings and, when appropriate, Congressional visits.

The Materiel Developer (e.g., AMC) will provide functional support to PEOs, including, but not limited to, personnel, security, cost analysis, automated data processing, training, MANPRINT, safety audit, logistics, public affairs, procurement contracting, and legal support. This critical support role must be conducted in a front-end, real-time fashion; on-going efforts to identify systemic improvements to streamline the acquisition process must be pursued.

Although AMC, USAMRDC, and ISC no longer have command or supervisory authority over PEOs and PMs, the AAE may request them to act as agents on his behalf to promulgate administrative and procedural guidance to PEOs. The MACOMs are responsible for developing appropriate standards; unresolved issues concerning compliance with functional standards will be elevated to the office of the AAE.

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The mission of the OASA(RDA) is to support the AAE and to establish and approve policies and standards for acquisition, procurement, technology base, program evaluation, and RDA planning and programming. As the AAE's support staff, OASA (RDA), provides PEO policies and procedures, and advice on matters involving research, development, and acquisition; procurement policy and procedures; competition advocacy; program/contractor reporting and evaluation; and PPBES. OASA(RDA) also acts on various matters requiring HQDA approval and provides staff direction to the PEOs on behalf of the AAE. Additionally, program performance and baseline evaluation of selected programs are determined and reviewed by OASA(RDA) activities.

OASA(RDA) reviews and validates the RDA budget (along with the OASA, Financial Management [FM]) and also monitors budget execution, including identification of programs for funding adjustments and management of the below-threshold reprogramming process.

OASA(RDA) is responsible for the promulgation of policy and policy oversight and is the proponent for acquisition regulations which apply to MACOMs in their support role to PEOs/PMs, as well as for the acquisition of non-PEO programs. OASA (RDA) also establishes and approves systems acquisition policy, participates in prioritizing RDA programs, structures the RDA program budget, and formulates the DA position on RDA matters. Other elements of the OASA provide similar support to the AAE in their functional areas of responsibility.

The University of Dayton

Engineering for Man-Machine Systems Course Offered

An "Engineering for Man-Machine Systems: Human Performance for System Designers" course will be held June 7-10, 1988 at the University of Dayton. The course is designed to provide scientists, engineers, and managers with a human performance framework for addressing equipment-related design problems and to sensitize designers to the use of human performance data in the integration, modification and evaluation of man-machine systems. See "Meetings of Interest" on page 10 for details.

The Army Medical Department and MANPRINT

by MAJ John Harris
U.S. Army Medical Materiel Agency

The Army Medical Department (AMEDD) recently participated in two successful MANPRINT conferences, the AMEDD Mid-Level Managers MANPRINT Conference held 4-6 January 1988, and the AMEDD MANPRINT Executive Session held 7 January 1988. Both conferences were held in San Antonio, Texas, and featured BG Richard T. Travis, Deputy Commanding General, US Army Medical Research and Development Command, as a guest speaker. BG Travis' remarks included a discussion of MANPRINT, as well as the PEO concept and its application within AMEDD.

The two sessions were based on the MANPRINT Senior Training Course, but tailored to the AMEDD community. Participants included combat developers and trainers from the Academy of Health Sciences (AHS); materiel developers from the U.S. Army Medical Research and Development Command; testers from the AMEDD Test Board, AHS; logisticians from the U.S. Army Medical Materiel Agency, Ft. Detrick, Maryland; and various representatives from The Surgeon General's Office.

The conferences focused on manpower and personnel integration policy and procedures and their application within the medical materiel acquisition process. Participants received instruction in MANPRINT roles and responsibilities, the MANPRINT domains, the System MANPRINT Management Plan (SMMP), requirements documentation, and the integration of MANPRINT into the procurement process. The MANPRINT/Industry interface and MANPRINT/NDI applications were also discussed in detail.

BG Travis emphasized to participants that MANPRINT is a process whose time has come. Stressing its importance in materiel acquisition documentation, he urged all concerned to use MANPRINT in order to improve the soldier-machine interface.

The Point of Contact for The Surgeon General's Office is Ms. Maribeth Love at AV 289-8081, or COMM (202) 756-8081. MAJ Harris may be reached at AV 343-7577, or COMM (301) 663-7577.

FOOTPRINT:
One Small Step for MPT

Kris Hoffman & Don Johnson
Defense Training & Performance Data Center

Dennis Collins
MANPRINT, Research and Studies Directorate,
HQDA (ODCSPER)

Editor's Note: The following article was obtained from the "9th Interservice/Industry Training Systems Conference Proceedings: November 30 - December 2, 1987." Because of its length, it will appear in the Bulletin in two installments.

In the summer of 1986, the Defense Training and Performance Data Center (TPDC) began the development of an automated manpower, personnel, and training (MPT) data integration technique under the sponsorship of the Army Soldier Support Center (SSC). The goals of this project, referred to as "Footprint," were to develop an automated tool in support of up-front analysis; this tool would utilize existing data bases and quickly display the training-related characteristics of an existing weapon system or end item. A series of standard MPT reports, aggregated either by predecessor system or by Military Occupational Specialty (MOS), could be produced from the compiled data.

The underlying premise of Footprint is that the MPT profile of the predecessor system is the best data available prior to, and during, the Concept Exploration phase. The importance of having a reliable MPT baseline during the Concept Exploration phase is underscored by studies which suggest that up to 70% of the life cycle costs of a new weapon system is fixed at the end of this phase. Ironically, the greatest opportunity to influence the development of a new system occurs when MPT analysis has traditionally been at its lowest level of intensity.

Comparability analysis methods such as HARDMAN are useful in forecasting specific MPT impacts, but, because they are complex and time-consuming processes, results are often yielded only after various design options have been evaluated in detail. Although comparability analysis permits the DOD program manager to predict MPT impacts accurately, increased MPT requirements may be predicted too late to change the system design without dramatic cost increases.

Footprint methodology provides a comprehensive profile of predecessor systems at the earliest phase of the acquisition process and allows a practical starting point for the development of a new weapon system. Footprint MPT reports contain both historical and projected authorizations of selected MOS, along with the many other training, performance, and force structure issues affected by the deployment of a new system. Although the MPT requirements will change as a result of a host of variables (such as accessions, MOS restructuring, and demands of the new program), fluctuations must be carefully managed in order to remain within resource limits.

Since 1986, Congress has become increasingly concerned about the MPT costs for new weapon systems. Section 2434 of title 10, U.S. Code, states that the services must provide the Secretary of Defense and Congress with a comprehensive manpower estimate, including training resources, prior to approval for a major system's entry into full-scale engineering development or production and deployment. This requirement, coupled with on-going programs to speed up the acquisition process, will place Program Managers (PM) in the difficult role of estimating, programming, and controlling MPT resources to a much greater extent than ever before. The use of automated data base tools such as Footprint, combined with existing MPT analysis techniques, will be essential in supporting new program planning and justification in the coming era of fiscal austerity.

Scope of the Footprint Prototype

The scope of the Footprint prototype was limited to integrating existing Army data sources to produce a series of standardized reports for three to five new system acquisitions. To test the Footprint concept, the Army Vice Chief of Staff, the Commander of the Army Soldier Support Center, and the Commandants of the Army Infantry and Army Signal Schools selected, as candidates for the Footprint prototype, six new weapon systems then in the Concept Exploration phase. These systems included the Armored Family of Vehicles (AFV), the Advanced Anti-Tank Weapon System-Medium (AAWS-M) and Heavy (AAWS-H), the Multi-Channel Communication Objective System (MCOS), the Frequency Hopping

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lultiplexer (FHMUX), and the Electro-Optic Test acility (EOTF).

The AFV project demonstrates the utility of the ootprint methodology. The object of the program is o define, develop, and plan the fielding of an AFV apable of defeating the threat through the beginning f the 21st century with concurrent reductions in ystem force Operation and Support (O&S) costs. he AFV will incorporate modularity, component ommonality, common battlefield signature, common ehicle electronics architecture, and multiple system apabilities. There are currently 29 AFV roles and nission requirements within the emerging family oncept. The AFV program must restrain the reation of additional MOS while striving to merge hose already in existence. Footprint can aid in assessing the potential impacts on involved person-nel and in developing strategies to minimize the MPTcosts associated with the AFV.

Development of the Footprint Prototype

With Army support, TPDC proceeded to identify those data elements, data sources, and report formats which would best help the AFV Task Force and Army PMs determine the MPT characteristics of the predecessor systems. To determine what critical information was required by MPT data users in the early phases of the acquisition cycle, interviews were conducted with a variety of Army personnel, including combat developers, training developers, and logisticians at Forts Benning, Gordon, Bliss, Eustis, Knox, Belvoir, and Lee.

The survey also examined how the data was used in the acquisition process in order to identify the most efficient means of displaying the standardized report formats. The results consistently identified the set of MPT data needed for completing the MANPRINT Target Audience Description (TAD); also identified as requiring MPT data input were the Early Compara-bility Analysis (ECA), Human Factors Engineering Analysis (HFEA), HARDMAN Comparability Analysis (HCA), and New Equipment Training Plans (NETP).

Determining which MPT data elements and report formats were needed showed that a large number of data sources were required to provide complete support in the early acquisition phase. At this point, in order to remain responsive to the AFV milestones, the focus of the prototype effort shifted to fulfilling the greatest percentage of MPT data needs with the most appropriate subset of existing data sources. Data sources were reviewed for content, complete-ness, and accessibility. Of those Army and DOD sources identified, five were selected to demonstrate the capabilities of the Footprint prototype: the Army Training Requirements and Resource System (ATRRS), the Personnel Management Authorization Document (PMAD), the Army Enlisted Master File (EMF), the Military Entrance Processing Command (MEPCOM) Accession File, and Army Regulation (AR) 611-201. Using the results of the Army inter-views as a guide, key data elements in each source were identified, and data file extracts were obtained; the process of determining exactly how the required report formats were to be generated was then addressed.

Figure 1. is a conceptual view of how the sepa-rate file extracts were merged to form a single Footprint reference file.

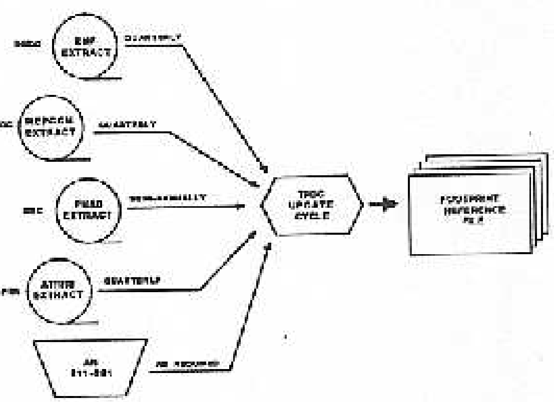

Figure 1. Footprint Reference File Update Cycle

In developing this reference file, several key file design issues were considered:

(1) Which data elements allow the merging of data from one file extract with data from another?

(2) How can the various file and data formats be used to form a single set of report formats while preserving the data integrity of each data source?

(3) What required MPT data elements are not

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Footprint *(Continued from page 8)*

visible in the file extracts, but can be discerned utilizing the existing data?

(4) Based on the magnitude of the data file extracts (approximately one billion bytes), how can the report formats be generated in an efficient and cost-effective manner?

All of these issues were successfully addressed during the formulation of the Footprint reference file, resulting in an integrated system that supports the generation of 27 unique report formats for any enlisted MOS.

Figure 1. also represents the "steady state" process of routinely receiving tape extracts quarterly/ semi-annually for Footprint reference file updates. Because the update cycle mirrors that of the data sources, these tapes represent the most current automated data available. In concept, any or all MOS reports could be produced systematically twice a year. If the need arises, "up to the minute" reports can be provided to the services in response to priority requests.

Content of the Footprint Reports

The 27 reports generated by the Footprint prototype are grouped into three functional categories: Force Structure, Training Profiles, and Performance Indicators. Each of the functional categories capture one or more of the predecessor system's MPT characteristics. A summary of the information contained in those reports is provided below by report category.

Force Structure: These reports quantify the current and projected (required and authorized) composition of a specified MOS. The force is broken down by pay grade, skill level, ASI, Unit Identification Code (UIC), and /or Fiscal Year. Qualifications for initial award of the MOS area are also included.

Training Profiles: The reports identify the One Station Unit Training (OSUT), Advanced Individual Training (AIT), as well as other training which has been or will be provided for a specified MOS and fiscal year. The number of enlisted personnel who previously graduated from a specified course and class is presented, along with the length of the class, the course attrition rate, and the percentage of class graduates who have stayed in the service subsequent to course completion.

Performance Indicators: Historical trends, by fiscal year, for a specified MOS population are displayed. This includes mental category distributions, average aptitude scores, ASVAB score distributions (in the qualifying aptitude area), retention rates by pay grade, years of service trends, educational trends, duty location (CONUS versus OCONUS) trends, gender trends, and primary versus duty MOS distributions by pay grade. The mental category distribution, average aptitude scores, ASVAB score distribution, and gender trends are also displayed for all accessions of a specified MOS by fiscal year.

For more information, contact MAJ Gregory D.Citizen, SSC-NCR, AV 221-0272, COMM (703) 325-0272, or LTC Rudy Laine, ODCSPER, AV 225-9213. COMM 695-9213.

Notice

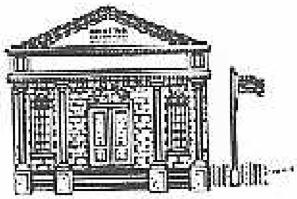
• Any additions, deletions, or changes to the MANPRINT Bulletin mailing list should be directed to the attention of Ms. Kristy Underwood at Automation Research Systems, Ltd., 4401 Ford Avenue, Suite 400, Alexandria, VA 22302, or telephone (703) 820-9000. Please use the Readers Response form provided on page 11, making sure to include old address label with any updates.

• As we announced in the January/February issue of the MANPRINT Bulletin, the MANPRINT Points of Contact List is in the process of being updated; it should be ready late March/early April. When you receive the new POC List, please verify that we have printed the correct information. Report any changes to the above ARS address.

• MANPRINT Training Course descriptions and scheduling information may be obtained from the above ARS address, ATTN: Ms. Nan Irick.

A New Masthead!

The new Bulletin masthead is in place! ARS's own Nan Irick created the design to highlight the essence of what MANPRINT is all about: the Soldier. Please feel free to comment on our new look--we value our readers' opinions.



Schedule of MANPRINT Courses for FY88/89

MANPRINT Senior Training Courses

28 Mar - 1 Apr 88 (Sill)	20-24 June 88 (Knox)*
25-29 Apr 88 (Picatinny)	1-5 Aug 88 (Monmouth)
23-27 May 88 (TACOM)	29 Aug-2 Sep 88 (Gordon)

*changed from 27 Jun - 1 Jul 88

MANPRINT Staff Officers Courses**

7- 25 Mar 88	11-29 Jul 88
4- 22 Apr 88	8-26 Aug 88
2-20 May 88	12-30 Sept 88
6-24 June 88	

**All courses will be held at the Casey Bldg., Humphrey's Engineer Support Activity Complex, Ft. Belvoir, VA.

MANPRINT INFORMATION

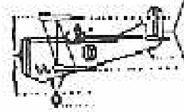
POLICY-MANPRINT, Research and Studies Directorate, HQDA (DAPE-MR). Washington, DC 20310-0300. AV 225-9213, COMM (202) 695-9213.

MANPRINT TRAINING - Soldier Support Center-National Capital Region, ATTN: ATNC-NM, Alexandria, VA 22332-0400. AV 221-3706, COMM (703) 325-3706.

PROCUREMENT & ACQUISITION - US Army Materiel Command, ATTN: AMCDE-PQ, Alexandria, VA 22333-0001. AV 284-5696, COMM (202) 274-5696.

HUMAN FACTORS ENGINEERING STANDARDS AND APPLICATIONS - Human Engineering Laboratory - MICOM Detachment, ATTN: SLCHE-MI, Redstone Arsenal, AL 35898-7290. AV 746-2048, COMM (205) 876-2048.

MANPOWER, PERSONNEL AND TRAINING RESEARCH - Army Research Institute, ATTN: PERI-SM, Alexandria, VA 22333-5600. AV 284-9420, COMM (202) 274-9420.



MEETINGS OF INTEREST

3-5 May 1988

Manpower, Personnel, Training, and Safety Conference. Orlando, FL. Contact: National Security Industrial Assn., 1015 15th St., NW, Suite. 901, Washington, D.C. 20005. Telephone: (202) 393-3620.

9-11 May 1988

Human Factors Engineering Technical Group Meeting. Baltimore, MD Contact: Louida Murray, 6714 West Geddes Ave., Littleton, CO 80123. Telephone: (303) 979-7441.

10-13 May 1988

Applications of Human Performance Models to System Design: A Technology Demonstration Workshop. Orlando, FL. NATO sponsored. Contact: Dr. Michael H. Strub, US Army Research Institute-Fort Bliss Field Unit, PO Box 6057, Ft. Bliss, TX 79906-0057.

7-10 June 1988

Engineering for Man-Machine Systems: Human Performance for System Designers. Univ. of Dayton, Dayton, OH. Contact: Jeffrey Landis, Research Institute, KL 462, Univ. of Dayton, Dayton OH 45469-0001. Telephone: (513) 229-3221

GENERAL INFORMATION

• Proposed articles, comments, and suggestions are welcomed, and should be mailed to: MANPRINT Bulletin, ATTN: HQDA (DAPE-MR), Washington, D.C. 20310-0300. Telephone: AV 225-9213, COMM (202) 695-9213.

LTG Allen K. Ono, Deputy Chief of Staff for Personnel

Mr. Harry Chipman, ODCSPER Coordinator

Ms. Nan B. Irick, Editor, ARS

Harold R Booher

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Director, MANPRINT, Research and Studies

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